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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/188,190	11/10/98	KANEKO	K 1472-177P

EXAMINER	
NGUYEN, T	
ART UNIT	PAPER NUMBER
3748	16

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/188,190	Kaneko et al.
Examiner	**Art Unit**
Tu M. Nguyen	3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jul 23, 2001*

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideratio

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-14* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☒ The proposed drawing correction filed on *Aug 25, 2000* is: a) ☒ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
18) ☐ Interview Summary (PTO-413) Paper No(s). _____
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

DETAILED ACTION

1. This Office Action is in response to an RCE filed on July 23, 2001.

Per instruction from the RCE, claim 1 has been amended according to the Applicants' After Final Amendment filed on June 11, 2001. Thus, claims 1-14 are pending in this application.

Claim Objections

2. Claim 1 in Applicants' After Final Amendment (Paper No. 13) is objected to because on line 12 of the claim, "both catalysts" should read --both the light-off catalyst and the exhaust gas purifying means--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1 and 8-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Hepburn et al. (U.S. Patent 5,974,788).

Re claim 1, as shown in Figure 1, Hepburn et al. disclose an exhaust gas purifying apparatus of an internal combustion engine, comprising:

- exhaust gas purifying means (32), provided in an exhaust passage of the internal combustion engine, for adsorbing NO_x in exhaust gas when an air-fuel ratio of the exhaust gas is lean, and releasing or reducing the adsorbed NO_x when an oxygen concentration of the exhaust gas is reduced;

- a light-off catalyst (26) provided upstream of the exhaust gas purifying means in the exhaust passage, the light-off catalyst having a lower O_2 storage capability than the exhaust gas purifying means (lines 48-50 of column 4), the light-off catalyst and the exhaust gas purifying means are in an exhaust passage in series so that all the exhaust gas from the engine passes through both the light-off catalyst and the exhaust gas purifying means regardless of the engine operation modes; and

- control means (20) for controlling the air-fuel ratio of the exhaust gas so that an atmosphere having a reduced oxygen concentration is produced around the exhaust gas purifying means (32) when an NO_x conversion efficiency of the exhaust gas purifying means is decreased. During a lean mode in the apparatus of Hepburn et al., in addition to NO_x, SO_x also accumulates in the exhaust gas purifying means (32), causing a reduction in NO_x conversion efficiency of the purifying means (32). Thus, SO_x stored in the purifying means (32) is occasionally purged by

modulating the amplitude of the air-fuel ratio at a properly chosen frequency to create O_2, HC, and CO break-through of the light-off catalyst. In this way, an atmosphere having reduced oxygen concentration is produced around the exhaust gas purifying means for the effective purging and reduction of SO_x.

Re claim 8, in the exhaust gas purifying apparatus of Hepburn et al., the internal combustion engine is a spark ignition type four-cycle engine that operates on the four-stroke cycle consisting of a suction stroke, compression stroke, combustion/expansion stroke, and exhaust stroke.

Re claim 9, in the exhaust gas purifying apparatus of Hepburn et al., the internal combustion engine is an in-cylinder injection type engine in which fuel is directly injected into a combustion chamber (lines 3-6 of column 2).

Re claims 10 and 11, the single catalyst of the exhaust gas purifying means (32) in the exhaust gas purifying apparatus of Hepburn et al. functions as a three-way catalyst.

Re claim 12, the light-off catalyst (26) in the exhaust gas purifying apparatus of Hepburn et al. includes a single catalyst that functions as a three-way catalyst (lines 12-13 of column 2).

Re claim 13, the exhaust gas purifying means (32) in the exhaust gas purifying apparatus of Hepburn et al. functions also as an NOx catalyst.

Re claim 14, being exposed to high temperature exhaust gas, the light-off catalyst (26) in the exhaust gas purifying apparatus of Hepburn et al. also inherently functions as a SO_x catalyst.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. as applied to claim 1 above, in view of Sanbayashi et al. (U.S. Patent 5,349,816).

Re claim 2, the exhaust gas purifying means (32) in the exhaust gas purifying apparatus of Hepburn et al. includes an NO_x catalyst (32) that adsorbs NO_x in the exhaust gas when the air-fuel ratio of the exhaust gas is lean, and releases or reduces the adsorbed NO_x when the oxygen concentration of the exhaust gas is reduced, the NO_x catalyst is located in the same passage and in series with the light-off catalyst. Hepburn et al., however, fail to disclose that the exhaust gas purifying means further includes a three-way catalyst provided downstream of the NO_x catalyst in the exhaust passage, for reducing harmful components in the exhaust gas when the air-fuel ratio of the exhaust gas is in the neighborhood of a stoichiometric ratio.

As shown in Figure 1, Sanbayashi et al. teach an exhaust emission control system comprising a three-way catalyst (23) provided downstream of the NO_x catalyst (22) in the exhaust passage, for reducing harmful components in the exhaust gas when the air-fuel ratio of the exhaust gas is in the neighborhood of a stoichiometric ratio. It would have been obvious to one

having ordinary skill in the art at the time of the invention was made, to have provided a three-way catalyst downstream of the NO_x catalyst as taught by Sanbayashi et al. in the apparatus of Hepburn et al., since the application thereof would have provided an effective means to purify the residual harmful emissions leaking through the NO_x catalyst.

Re claim 5, the three-way catalyst (23) (from Sanbayashi et al.) in the modified apparatus of Hepburn et al. obviously has an oxygen storage greater than that of the light-off catalyst (26).

7. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. as applied to claim 1 above, in view of design choice.

The exhaust gas purifying apparatus of Hepburn et al. discloses the invention as cited above, however, fails to disclose that an amount of oxygen adsorbed on the light-off catalyst is not greater than about 150 cc per one-liter volume of the catalyst when measured by an oxygen pulse method and that an oxygen component stored in the light-off catalyst is not greater than about 25 gr per one-liter volume of the catalyst.

One having ordinary skill in the art of exhaust emission control would have recognized that selection of the maximum volumetric or weighted amount of oxygen adsorbed in a light-off catalyst would be a function of many variables such as engine size, engine operating conditions (load, speed, etc), air and fuel properties, capacity and size of a main catalyst, etc. Moreover, there is nothing in the record which establishes that the claimed maximum volumetric or weighted amount of oxygen adsorbed in a light-off catalyst presents a novel of unexpected result (See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)).

8. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Sanbayashi et al. as applied to claim 5 above, and further in view of design choice.

The modified exhaust gas purifying apparatus of Hepburn et al. discloses the invention as cited above, however, fails to disclose that an amount of oxygen adsorbed on the light-off catalyst is not greater than about 150 cc per one-liter volume of the catalyst when measured by an oxygen pulse method and that an oxygen component stored in the light-off catalyst is not greater than about 25 gr per one-liter volume of the catalyst.

One having ordinary skill in the art of exhaust emission control would have recognized that selection of the maximum volumetric or weighted amount of oxygen adsorbed in a light-off catalyst would be a function of many variables such as engine size, engine operating conditions (load, speed, etc), air and fuel properties, capacity and size of a main catalyst, etc. Moreover, there is nothing in the record which establishes that the claimed maximum volumetric or weighted amount of oxygen adsorbed in a light-off catalyst presents a novel of unexpected result (See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)).

Prior Art

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of two patents.

- Hepburn (U.S. Patent 5,743,084) discloses a method for monitoring the performance of a NO_x trap.

- Asik et al. (U.S. Patent 5,758,493) disclose a method and apparatus for desulfating a NO_x trap.

Communication

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623. The fax phone number for this group is (703) 308-7763.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

Tu M. Nguyen

TMN

August 1, 2001

Tu M. Nguyen

Patent Examiner

Art Unit 3748

Thomas Denion

THOMAS DENION
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700

Attachment for PTO-948 (Rev. 03/01, or earlier)
6/18/01

The below text replaces the pre-printed text under the heading, "Information on How to Effect Drawing Changes," on the back of the PTO-948 (Rev. 03/01, or earlier) form.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

1. Correction of Informalities -- 37 CFR 1.85

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the Notice of Allowability. Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136(a) or (b) for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit the drawing corrections within the time period set in the attached Office communication. See 37 CFR 1.85(a).

Failure to take corrective action within the set period will result in **ABANDONMENT** of the application.